University of Bahrain
College of Information Technology
Department of Computer Science
Semester 2, 2010-2011
ITCS 101/ITCS 103 (Introduction to Computer Science)

Mid-Term Exam – Form A

Date: 13th June 2011 **Time: 12:00-13:30PM**

STUDENT NAME	
STUDENT ID #	
SECTION #	

NOTE: THERE ARE SEVEN (7) PAGES IN THIS TEST
WRITE ONLY ONE SOLUTION FOR EACH QUESTION

Question #	MARKS		COMMENTS
1	10		
2	12		
3	11		
4	13		
5	14		
TOTAL	60		

Question 1 (10 Points)

YOU MUST SHOW your work in each of the following parts

(i) [6 Points] Convert the following numbers from/to indicated bases:

a- $(57)_8$ = (71 $)_{10}$

32 16 8 4 2 1
1 1 1 0 0 1

7 1

الذيب

b- $(60)_{10}$ = (3C $)_{16}$

32 16 8 4 2 1
0 0 1 1 1 1 0 0

3 C

c- $(A08)_{16}$ = (10100001000 $)_2$

1 0 1 0 0 0 0 0 1 0 0 0

A 0 8

(ii) [4 Points] Perform the following arithmetic operations:

a- The binary sum of 11110 and 10111

```
 1 1  1  1
  1 1 1 1 0
  1 0 1 1 1   +
  ---------
1 1 0 1 0 1
```

b- The binary multiplication (product) of 110101 and 101

```
      110101
      101
      ------
1111  1
      110101
     000000
    110101
    ---------
  100001001
```

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Question 2 (12 Points)
What is the output of the following codes?

(1) Suppose the user input is:
Welcome to
ITCS103 & 123

```
char c1,c2;
int x;
string s1,s2;
getline(cin,s1);
cin >>s2>>c1;
cin.get(c2);
cin>>x;
cout<<c1<<c2<<x;
cout<<s2<<"\t"<<s2;
```

& 123ITCS103   ITCS103

```
(2)
int x = 10, y;
if(x%2 == 0 && x/5 == 2)
     y = x++;
else
     y = ++x;
cout << "x = " << x <<endl;
cout << "y = " << y <<endl;
```

X = 11
Y = 10

```
(3)
cout<<(15%4==3 ? "ABC\nD" : "KFG\nH");
```

ABC

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(4)

```
int x = 3;
while ( x )
{
      cout << 100-x << endl;
      --x;
}
```

97
98
99

(5)

```
int c=0, t=0;
while (c++ < 4){
      if (c<3)
            t+=c;
      else
            t++;
      cout<<c<<"=>"<<t<< endl;
}
```

1 => 1
2 => 3
3 => 4
4 => 5

Question 3 (11 Points)

Write a program that reads two integers representing hours and minutes from a file named **time.txt**. The program should convert the time (hours and minutes) to seconds. Your program should write the result in new file called **output.txt** as the sample below:

time.txt	output.txt
10 15	Time in Seconds = 36900

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```
#include<iostream>
#include<fstream>
#include<string>
using namespace std;
int main(){

        long x,y;
        int z;

ifstream fin;
ofstream fout;

fin.open("time.txt");
fout.open("output.txt");

        if(!fin || !fout)
{
                cout<<"can't open file "<<endl;
                return 1;
}
fin>>x;
fin>>y;

z=(((x*60)+y)*60);

fout<<"Time in Seconds = "<<z;

fin.close();
fout.close();

return 0
```

Question 4 (13 Points)

Scores attained by a student in two exams are to be entered to a computer (double numbers between 0.0 and 100.0). An indication of Pass or Fail is printed out after the two marks are entered. The criteria for passing are as follows:

- A student passes if **both** examinations are passed where the pass mark for an individual subject is 60.
- Additionally a student may pass if only one subject is failed **and** the overall average is greater than or equal to 60.

Write a C++ program that prompts the user to input two exam marks and prints whether the student has pass the course or fail.

Sample Input/ Output

```
Enter two exam marks:  95.5     45.0

Pass
```

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```
#include<iostream>
using namespace std;
int main() {

double a,b,avg;

 cout<<"Enter two exam marks: ";
 cin>>a;
 cin>>b;

 avg=(a+b)/2;

 if (a>100 || a<0 || b<0 || b>100)
        cout<<" wrong value "<<endl;
 else
        if(a>= 60 && b>= 60 || avg>= 60)
                cout<<"Pass"<<endl;
        else
                cout<<"fail"<<endl;

return 0;
   }
```

Question 5 (14 Points)

Write a program that reads student's id, GPA, and credit hours completed for multiple students. The program should stop reading when a negative id is entered (see sample below). Your program should print the number of students expected to graduate. A student is expected to graduate if he/she has a GPA greater than or equal to 2.0 and has completed at least 95 credit hours.

Sample Input/ Output

```
Enter student's id, GPA, and hours (negative to stop)
20081234    3.3     87
20081235    2.3     99
20092351    1.9     50
20071236    3.7     101
20081237    1.99    96
20108765    3.2     45
20073254    2.8     112
-1

Expected to graduate are 3 students.
```

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```
#include<iostream>
using namespace std;
int main()
{
 int id , hours, count;
 double gpa;

 cout<< "Enter student's id, GPA, and hours (negative to stop)"<<endl;
cin>>id;

 while( id!= -1 )
 {
    cin>>gpa;
    cin>>hours;

 if(hours>=95 && gpa>=2.0)
 count++;

cin>>id;
 }
  cout<<"Expected to graduate are "<<count<<" students."<<endl;

 return 0;
  }
```